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# Entrepreneurial self-efficacy: A systematic review of the literature on its theoretical foundations, measurement, antecedents, and outcomes, and an agenda for future research

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## ABSTRACT

With increased emphasis being placed on entrepreneurial thinking and acting in today's careers, we have witnessed growing research on entrepreneurial self-efficacy (ESE) over the last two decades. The present study provides a systematic review of the literature on the theoretical foundations, measurement, antecedents, and outcomes of ESE, and work which treats ESE as a moderator. Based on the review, an agenda for future research is developed and implications for entrepreneurship education and training highlighted. In doing so, the need to consider alternative theoretical perspectives to improve understanding of how ESE influences outcomes at different levels of analysis is highlighted. In addition, the review identifies a need to a) examine the factors which drive short-term fluctuations and long-term changes in ESE, b) examine the developmental precursors of ESE in childhood, adolescence and early adulthood, c) examine the negative/curvilinear effects of ESE, d) investigate whether ESE can be treated as a collective level phenomenon, e) look at the effects of ESE on outcomes outside of entrepreneurial contexts, and f) improve measurement and research design.

## 1. Introduction

How individuals think and act entrepreneurially has become an important question for researchers, educators, and policy makers seeking to support entrepreneurial activities either undertaken independently by individuals or within organizations (Hisrich, Langan-Fox, & Grant, 2007). Within business research, entrepreneurship is typically defined as the process of discovery/co-creation, evaluation, and exploitation of opportunities to produce goods and services (Shane, 2012). In today's work world, both being an independent business founder/entrepreneur (Zacher, Biemann, Gielnik, & Frese, 2012), and engaging in intrapreneurship in established organizations (Antoncic & Hisrich, 2001) are important as individuals increasingly face unstable career paths. While scholars argue that the positive influence of entrepreneurial start-ups on job creation has been overrated (Shane, 2009), the modest percentage of entrepreneurial start-ups that do succeed have potential to create job opportunities if guided by effective policies. Meanwhile, intrapreneurship within wage employment also helps organizations innovate and grow, and respond proactively to social, technological, and economic shifts. Moreover, entrepreneurial skills have been emphasized as part of a general skill set needed to succeed in dynamic modern occupations (Savickas et al., 2009), e.g. to manage one's career in an uncertain context and to respond

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to new opportunities resulting from technological change. In other words, entrepreneurial thinking and behavior might help generations of people to be producers of their own positive career development as a means to navigate larger societal changes.

It is generally acknowledged that entrepreneurial self-efficacy (ESE), which refers to an individual's belief in his/her capability to perform tasks and roles aimed at entrepreneurial outcomes (Chen, Greene, & Crick, 1998), plays a crucial role in determining whether individuals pursue entrepreneurial careers and engage in entrepreneurial behavior. While some researchers have looked at general self-efficacy (a global belief about one's capabilities to solve future tasks of any kind) to understand its effects (see Judge & Bono, 2001; Scholz, Gutiérrez-Doña, Sud, & Schwarzer, 2002), most experts agree that self-efficacy is domain-specific (e.g., targeted towards a certain behavior or outcome such as one's career or creative tasks), consistent with Bandura's (1997) conceptualization of the construct. The social cognitive theory of career and academic interest, choice, and performance (Lent, Brown, & Hackett, 1994) emphasizes, for example, that it is occupation-specific self-efficacy (as opposed to generalized self-efficacy) that exerts effects on career development and performance. One type of occupation-specific self-efficacy is entrepreneurial self-efficacy (ESE).

The agency perspective, informed by self-efficacy research (Bandura, 1986, 1997), is seen as a leading meta-approach to entrepreneurship that helps us to understand an entrepreneur's actions and action-related beliefs (Frese, 2009). Entrepreneurship not only involves risk-taking, uncertainty, creativity, leadership and proactivity, but also requires persistence and passion. For all these factors, ESE is highly relevant. As such, ESE has emerged as a key psychological construct in entrepreneurship research (Miao, Qian, & Ma, 2017), having been found to influence entrepreneurial motivation, intention, behavior and performance, as well as being a critical target outcome of entrepreneurship training and education. Moreover, due to the growing influence of entrepreneurial thinking and acting on career development and vocational behavior (Obschonka, Hakkarainen, Lonka, & Salmela-Aro, 2017; Uy, Chan, Sam, Ho, & Chernyshenko, 2015), the specific topic of ESE is also becoming increasingly relevant to career researchers, educators and policy makers (World Economic Forum, 2009). In view of the broad relevance of ESE to researchers, educators and policy makers alike, in the present article we review extant work on ESE, synthesizing prior empirical work on its antecedents, outcomes and moderators in order to take stock of our knowledge on variables that are related to ESE, as well as to highlight and address discrepancies in how ESE has been conceptualized and measured. In addition, we integrate the key findings from our review into a framework to inform entrepreneurial education and training and develop a comprehensive agenda for future research.

Through systematically reviewing the literature on ESE the present study makes a number of contributions to the entrepreneurship and vocational behavior literatures, as well as having implications for policy makers and educators. First, despite the obvious relevance of ESE for entrepreneurship and career development, no systematic literature review on ESE exists. Although a recent meta-analytical study has looked at the relationship between ESE and the performance of entrepreneurial firms (Miao et al., 2017), this study did not investigate the effects of ESE on other outcomes of ESE, and the factors that foster ESE.<sup>1</sup> In line with other recent reviews of central career constructs in the field of vocational behavior (e.g. Duffy & Dik, 2013; Johnston, 2018), our systematic review will allow us to clarify the nomological network of variables to which the construct of ESE is related, highlight how ESE has been conceptualized and measured in previous research, and identify the key theoretical perspectives that researchers have drawn on to explain how ESE beliefs develop and influence individuals' attitudes and behaviors.

Second, given that prior research on ESE is fragmented, with researchers from diverse disciplinary backgrounds adopting a wide variety of methodological and theoretical approaches to examine different research questions, we also contribute to the literature by developing a framework which synthesizes findings from existing research (see Fig. 1). Such a framework will not only bring much needed clarity to the key insights derived from prior work, but also provide a basis to inform future research. It will also assist educators and policy makers to develop training and education solutions that enhance entrepreneurship amongst the next generation to prepare for a dynamic work world which increasingly values entrepreneurial thinking and behavior (World Economic Forum, 2009) and provide insights for investors evaluating entrepreneurial businesses (Brooks, Huang, Kearney, & Murray, 2014).

Third and most importantly, the present study makes a critical contribution by identifying neglected research fields and inconsistencies in the literature, and highlighting opportunities for empirical and theoretical advancement of the research domain.

In the following section, we highlight the methods adopted to search for empirical literature on ESE, before commencing our review of the literature.

## 2. Methods

In line with best practice (Short, 2009), we used Web of Science, Google Scholar, and related databases to identify peer-reviewed articles with entrepreneurial self-efficacy in their title, keywords or abstract that were published from the beginning of 1998 to the end of 2017. We decided to limit our search to articles published after 1998, when Chen et al.'s (1998) work, which suggests ESE is a key feature distinguishing entrepreneurs from managers, was published. In addition, to identify further articles on ESE which did not include the term in their title, abstract or keywords, we undertook an exhaustive backward and forward citation search of the already identified articles. To ensure the quality of articles used in the literature review, we only included articles if they met the following criteria: (a) the article was available in an ISI listed peer-reviewed journal, and (b) it focused on ESE rather than general self-efficacy (Baum & Locke, 2004), self-initiative (Frese, 2009), or locus of control (Kaufmann, Welsh, & Bushmarin, 1995). Given we chose to focus on the domain specific measure of ESE we did not include a significant body of research which focuses on the antecedents and outcomes of general self-efficacy in entrepreneurial settings (for example, see Baum & Locke, 2004; Markman, Baron, & Balkin, 2005;

<sup>1</sup> We also note that while Rauch and Frese (2007) undertook a meta-analysis of the relationship between self-efficacy and entrepreneurial outcomes, they focused on general self-efficacy.

### Antecedents of Entrepreneurial Self-Efficacy

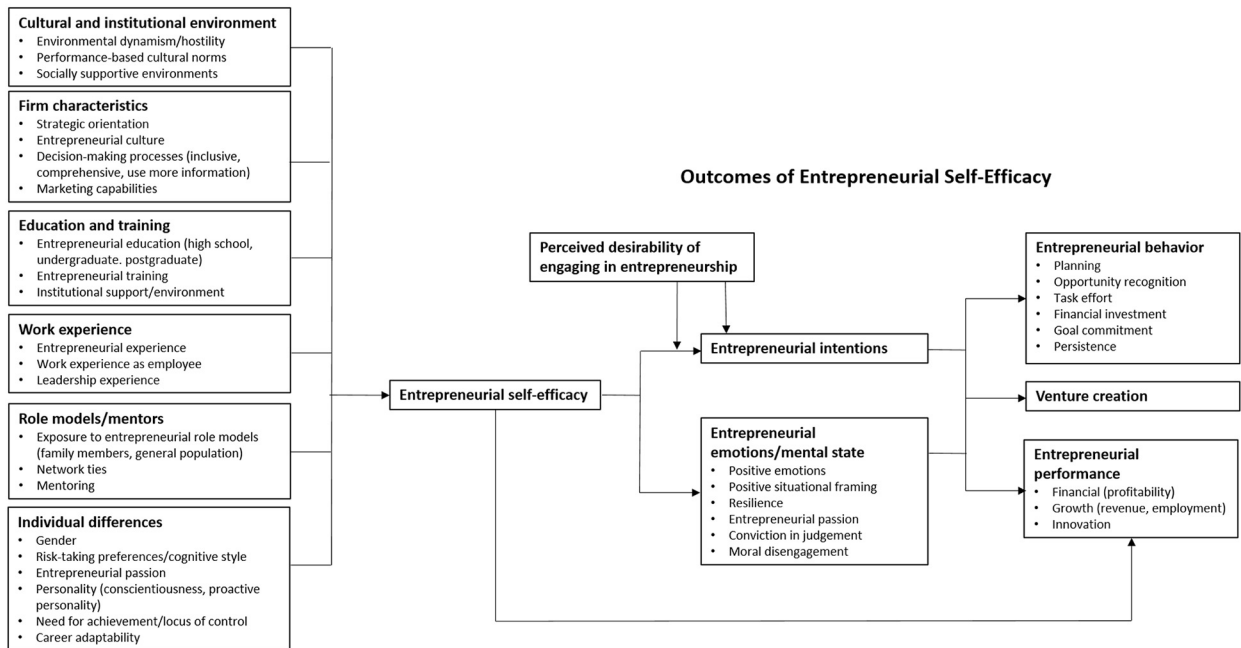


Fig. 1. Framework summarizing extant research on entrepreneurial self-efficacy.

Obschonka, Hahn, & Bajwa, 2018).

Two authors independently screened the downloaded articles to decide whether they met the inclusion criteria, and consulted with one another as to whether to exclude certain articles. A number of articles were excluded as they measured general self-efficacy rather than ESE. We did not include book chapters, unpublished papers or dissertations as we could not verify the quality of research given the lack of peer review.

Our literature search left us with a total of 128 studies for inclusion in our review, of which 121 were quantitative, 4 qualitative, 1 meta-analytical, and 2 conceptual in nature. In the following sections we review the literature on ESE. In doing so we examine the theoretical bases of ESE, pinpoint how ESE has been measured in previous studies, review prior literature on the antecedents and outcomes of ESE, and studies in which ESE has been treated as a moderator.

### 3. Literature review

#### 3.1. Theoretical foundations of ESE

Our review identified a number of theoretical perspectives that explain how ESE develops and influences entrepreneurial outcomes. ESE emerges from the broader concept of self-efficacy rooted in social cognitive theory, which highlights the role of social context, observation and replication of behavior in social learning for development of self-efficacy beliefs. Self-efficacy, along with domain-specific constructs such as ESE, has theoretical roots in the agency perspective in which individuals are seen to interact reciprocally with internal and external environments. Thus, self-efficacy and its derivatives represent a mechanism of agency, driving motivation, mental states, and behavior (Bandura, 1997, 2006). With agency underlying self-efficacy as a key theoretical approach to study entrepreneurial actions and beliefs (see Frese, 2009), ESE is seen to influence a range of career choice and performance outcomes.

To date, ESE research has drawn upon theoretical perspectives from a myriad of fields, including psychology, career development, and economics. Extant research into ESE's antecedents typically draws upon social cognitive theory (Bandura, 1997; Drnovšek, Wincet, & Cardon, 2010) to understand how ESE develops via mastery experiences, vicarious learning, social persuasion, and physiological states. These pathways provide mechanisms of action by which work and start-up experience, as well as education and training, are thought to influence ESE. The pathways also provide a basis to examine firm-level and macro-level cultural and institutional influences on ESE development.

Research on the outcomes of ESE meanwhile tends to draw upon both social cognitive theory and the theory of planned behavior (Ajzen, 1991), to explain the emergence of entrepreneurial intentions, and entrepreneurial actions such as venture creation and growth. According to the theory of planned behavior, ESE captures the extent of an individual's perceived behavioral control which is a key determinant of their intention to engage in a certain behavior (Krueger, Reilly, & Carsrud, 2000). As such, according to this theory ESE fosters entrepreneurial behavior through heightening an individual's entrepreneurial intentions (Chen et al., 1998;

Schlaegel & Koenig, 2014). In addition, research on ESE has begun to incorporate additional theoretical perspectives, such as effectuation (e.g. Engel, Dimitrova, Khapova, & Elfring, 2014), self-regulation (Shepherd, Patzelt, & Baron, 2013), and regulatory focus (Cooper, Peake, & Watson, 2016) theories, to explain the influence of ESE, and in which contexts such influence is likely to have more or less positive effects.

### 3.2. Measurement of ESE

Several different measures of ESE were used across the 121 quantitative studies identified in our review, of which 6 focused solely on scale development or testing. The most widely-used measure has been the 22-item multi-dimensional measure developed by Chen et al. (1998). Of the 121 studies that measured ESE, 22 used this scale or a modified version of it. The items that form this scale were derived from content analyses of the previous literature and interviews with entrepreneurs. Factor analysis undertaken on the items indicated that ESE is made up of 5 sub-dimensions or factors which capture an entrepreneur's self-efficacy in relation to marketing, innovation, management, risk-taking and financial control. Part of the popularity of Chen et al.'s (1998) measure (approximately one-fifth of empirical studies of ESE have employed it either in part or in its entirety) is the fact that it has been in existence for longer than any other self-report ESE scale. Notably, its use has not diminished significantly with time; both Cooper et al. (2016) and Austin and Nauta (2016) are recent examples of studies that use this measure. The measure has been used with a variety of different samples, including college students, small business owners, franchisees and entrepreneurs.

Shortly after the study by Chen et al. (1998), DeNoble, Jung, and Ehrlich (1999) developed an alternative 22-item multi-dimensional measure of ESE that captures “the entrepreneurial skills that are uniquely different from managerial skills” (p.3). This is consistent with Bandura's (1986) recommendations regarding the development of domain-specific self-efficacy measures. The modifications made by DeNoble et al. (1999) proved to be well received by other researchers, and 19 of the studies in our survey used either the original measure by DeNoble et al. (1999) or a modified version of it, making this measure the most frequently used after that of Chen et al. (1998). The measure itself was developed by content analyzing responses from entrepreneurs to a question asking them to describe the critical issues they faced in the start-up and early development of their company. The measure comprises six sub-dimensions which capture an entrepreneur's self-efficacy in relation to developing new product and market opportunities, building an innovative environment, initiating investor relationships, defining core purpose, coping with unexpected challenges, and developing critical human resources.

Aside from the scales developed by Chen et al. (1998) and DeNoble et al. (1999), there have been three additional self-report measures of ESE developed in the literature and used in multiple studies, although none have proved as popular. Zhao, Seibert, and Hills (2005) developed a 4-item global measure which measures an individual's self-efficacy in relation to specific entrepreneurial tasks. Zhao et al. (2005) reported that there is a strong relationship between their measure and that developed by Chen et al. (1998), and a weaker relationship to measures of general self-efficacy. Only 12 of the studies in our review used Zhao et al.'s (2005) measure, perhaps because it is not clear what, if any, advantage it has over the more frequently employed measures developed by Chen et al. (1998) and DeNoble et al. (1999).

Barbosa, Gerhardt, and Kickul (2007) developed a measure of ESE which comprises 4 sub-dimensions. These are opportunity identification self-efficacy, relationship self-efficacy, managerial self-efficacy and tolerance self-efficacy. However, this multi-dimensional measure has only been adopted in two studies to date (Barbosa et al., 2007; Chen & He, 2011).

More recently, McGee, Peterson, Mueller, and Sequeira (2009) argued that “there remain inconsistencies in the definition, dimensionality, and measurement of ESE” (p.965). They proposed a refined 19-item multi-dimensional measure of ESE suited for both nascent and experienced entrepreneurs. McGee et al.'s (2009) measure incorporates four different phases of business creation (searching, planning, marshalling, and implementation), adding a temporal dimension not present in previous measures. Factor analysis of the survey items indicated that ESE is made up of 5 sub-dimensions which capture an entrepreneur's self-efficacy in relation to searching for opportunities, planning, marshalling resources, and implementing in relation to people and financial resources. Compared to other multi-dimensional measures of ESE which capture ESE in relation to general activities undertaken by the entrepreneur, the McGee et al. (2009) measure captures ESE in different phases of the venture creation and development process. In our review, 14 of the studies use McGee et al.'s (2009) measure. For example, Spagnoli and Santos (2017) recently examined the validity and reliability of this measure using data from Italy and Portugal, with results providing support for the use of the scale outside of the original population for which it was developed.

Although Barakat, Boddington, and Vyakarnam (2014) proposed a measure of ESE comprising 7 sub-dimensions of ESE, it has yet to be employed in empirical work beyond the original study for which it was designed and is weak methodologically as each of the sub-dimensions of ESE is captured by only one item. The 7 sub-dimensions of ESE capture an entrepreneur's self-efficacy in relation to innovation, financial valuation, teamwork, product development, start-up processes, leadership and creativity.

A small number of studies have used data from the Panel Study of Entrepreneurial Dynamics (PSED) to measure ESE (e.g. Brinckmann & Kim, 2015). As is common with the measurement of complex psychological constructs in national panels, there is a trade-off between the number of items in the questionnaire and the reach of the questionnaire into the population. Such data sets typically contain large representative samples, which is made possible in part by reducing the number of questionnaire items. Often complex constructs are measured using a few items or a single item. While it is possible that construct validity may be compromised with such an approach, the data from national panels are longitudinal (in contrast to most studies in this area), and are thus a valuable addition to the usual cross-sectional studies.

Finally, the remaining studies in our survey used ad hoc measures developed for each study (e.g. Schjoedt & Craig, 2017). As these measures are idiosyncratic, their use does not tend to extend beyond the study for which they were designed. In Table 1 we highlight the key measures used in previous research and the sub-dimensions of ESE that these measures capture.

**Table 1**  
Key measures of entrepreneurial self-efficacy.

Measure	Number of items	Sub dimensions (ESE in relation to)
Chen et al. (1998)	22 items	Marketing (6 items) Innovation (4 items) Management (5 items) Risk-taking (4 items) Financial control (3 items)
DeNoble et al. (1999)	23 items	Developing new product and market opportunities (7 items) Building an innovative environment (4 items) Initiating investor relationships (3 items) Defining core purpose (3 items) Coping with unexpected challenges (3 items) Developing critical human resources (3 items)
Zhao et al. (2005)	4 items	Global scale (no sub dimensions)
McGee et al. (2009)	19 items	Searching (3 items) Planning (4 items) Marshalling (3 items) Implementing: people (6 items) Implementing: financial (3 items)
Barbosa et al. (2007)	18 items (not clear how many items fall under each sub dimension)	Opportunity identification Relationship Managerial Tolerance
Barakat et al. (2014)	7 items (one item for each sub-dimension)	Innovation Financial value Teamwork Product development Start-up processes Leadership Creativity

### 3.3. Antecedents of ESE

A growing literature has identified factors that may foster or inhibit ESE formation. Such work not only shows that ESE is malleable, but also highlights the usefulness of interventions aimed at encouraging individuals to pursue entrepreneurial careers and develop entrepreneurial ventures. The following sections examine the key antecedents of ESE including work experience, education and training, role models and mentors, individual differences, firm characteristics, and the cultural and institutional environment. When investigating antecedents of ESE, most researchers have drawn on social cognitive theory (Bandura, 1997) to highlight the pathways by which ESE develops. Such pathways include mastery experience, vicarious learning, social persuasion, and judgement of one's physiological states (the “affective state” pathway). In the following sections we examine antecedents at the individual, firm and macro levels and map such antecedents against the pathways specified by Bandura (1997).

#### 3.3.1. Individual level antecedents

**3.3.1.1. Work experience.** One factor which has been shown to foster ESE is prior work or leadership experience. In particular, there is growing evidence that prior experience in establishing or running one's own business fosters ESE as it provides opportunities for mastery experiences and vicarious learning (Lee, Hallak, & Sardeshmukh, 2016; Zhao et al., 2005). Researchers have also established that more general work experience as an employee enhances individuals' ESE through the same mechanisms (Farashah, 2015; Hockerts, 2017; Pfeifer, Šarlija, & Sušac, 2016). However, while the quality of work experience in a family business was found to be positively related to the ESE of family business successors, the length of work experience was not (Sardeshmukh & Corbett, 2011). Examining the effects of leadership and work experience on middle and high school students' ESE, Kickul, Wilson, Marlino, and Barbosa (2008) found that although the relationship between leadership experience and ESE was significant for both groups of students, the relationship between work experience and ESE was only significant for male high school students.

**3.3.1.2. Education and training.** There is growing evidence that participation in entrepreneurial education and training programs enhances the ESE of postgraduate students (Kubberød & Pettersen, 2017; Wilson, Kickul, & Marlino, 2007; Zhao et al., 2005), undergraduate students (Byabashaija & Katano, 2011; Gielnik, Uy, Funken, & Bischoff, 2017; Karlsson & Moberg, 2013; Nowiński, Haddoud, Lančarič, Egerová, & Czeglédi, 2017), high school students (Sanchez, 2013), and the general population (Kerrick, Cumberland, & Choi, 2016; Lee et al., 2016). Consistent with social cognitive theory (Bandura, 1997), scholars argue that entrepreneurial education provides opportunities for mastery experiences, vicarious learning, social persuasion, and judgments of one's own physiological state (Zhao et al., 2005). For example, students' enactive mastery is promoted through the use of business plans and live case studies. Education and training also provides opportunities for vicarious learning through the observation of successful role models. Entrepreneurship educators also use social persuasion to enhance students' ESE when providing mentoring to students and feedback on their assessments. Finally, by learning about the lifestyles of entrepreneurs and how they deal with



challenges, students develop their own psychological coping strategies. These strategies help them maintain motivation and deal with anxiety, leading to greater confidence in their future chances of success. However, although Shinnar, Hsu, and Powell (2014) found that undergraduate students' participation in entrepreneurship education led them to develop higher ESE beliefs, they also found that this was only statistically significant for males.

Recent work has also examined the link between the teaching methods adopted by entrepreneurship lecturers and the ESE of undergraduate students (Abaho, Olomi, & Urassa, 2015). Abaho et al. (2015) found that the presence of successful entrepreneurs in classes, personal reading and handout notes, class presentations and imaginary case studies all influenced students' ESE. They also found that when lecturers had business experience, students had higher levels of ESE as such individuals enhance vicarious learning. Kasseean, Vanevenhoven, Liguori, and Winkel (2015) found a strong relationship between undergraduates' participation in entrepreneurial experiential learning activities during their study and their ESE. Gielnik et al. (2015) examined the influence of an action-based entrepreneurship program on undergraduate students' ESE over time. Compared with a control group, participants in a training group exhibited higher levels of ESE after a 12-week training program. These findings are consistent with social cognitive theory in that they highlight the influence of mastery experiences and vicarious learning on ESE.

Researchers have also begun to look at how universities specifically foster ESE amongst students, outside more formal entrepreneurship education programs. For example, Saeed, Yousafzai, Yani-De-Soriano, and Muffatto (2015) found that students' perceptions of educational support for entrepreneurship, support for business development, support for concept development, and institutional support for entrepreneurship were all positively related to their ESE. Other work has examined the effects of more vocational entrepreneurship education programs on ESE. For example, Maritz and Brown (2013) found that participation in a vocational entrepreneurship education program led individuals to exhibit higher levels of ESE, especially females and individuals who did not have entrepreneurial role models in their families. Similarly, Boukamcha (2015) found participation in an entrepreneurship training program led to higher levels of ESE. Venugopal, Viswanathan, and Jung (2015) found that marketplace literacy training improved the ESE of low income women.

Finally, research has also established that training interventions designed to enhance participants' emotional competences also leads to higher levels of ESE compared to a control group who did not undertake the training (Hodzic, Ripoll, Lira, & Zenasni, 2015). The authors argue this may result from the training heightening their positive affective state, one of the four pathways to self-efficacy development highlighted by Bandura (2012).

**3.3.1.3. Presence of role models and mentors.** In line with social cognitive theory, there is growing evidence confirming a positive relationship between the presence of role models and ESE. Role models not only provide opportunities for vicarious learning (i.e., learning from others) but are also a good source of social persuasion, making individuals feel more confident to pursue an entrepreneurial career (BarNir, Watson, & Hutchins, 2011). In addition, by learning from role models about how they cope with challenges and stress, individuals are better able to develop strategies to deal with challenges and maintain a positive physiological state. Several studies have generally confirmed a positive link between student's exposure to entrepreneurial role models and their ESE (BarNir et al., 2011; Laviolette, Lefebvre, & Brunel, 2012; Vanevenhoven & Liguori, 2016). While Austin and Nauta (2016) found that female undergraduates' exposure to role models was positively linked to ESE, they surprisingly found that this relationship was only significant when the role model was male.

Researchers have also found that exposure to entrepreneurial role models in the general population (Farashah, 2015) and in family business settings (Carr & Sequeira, 2007; Pfeifer et al., 2016) is positively related to individual's ESE, and that an entrepreneur's strong ties with friends and family are positively related to their ESE (Chen & He, 2011). Interestingly, while Prodan and Drnovsek (2010) found that academics' personal networks outside the university were related to their ESE, the presence of academic role models was not. St Jean and Mathieu (2015) drew on social cognitive career theory to explain the effects of mentoring on ESE. They found that the quality of mentoring provided to novice entrepreneurs as part of a mentoring scheme was positively related to their ESE. Similarly, Huyghe and Knockaert (2015) found the presence of role models in the university sector was positively related to the ESE of potential academic entrepreneurs.

**3.3.1.4. Individual differences.** The individual difference that has gained the most attention as an antecedent of ESE is gender. Although research generally indicates that females on average have lower levels of ESE than males (Dempsey & Jennings, 2014; Díaz-García & Jiménez-Moreno, 2010; Wilson, Kickul, Marlino, Barbosa, & Griffiths, 2009), including studies drawing on data from the large scale Global Entrepreneurship Monitor (GEM) Project, (e.g. Wennberg, Pathak, & Autio, 2013), and that this may be attributed to less entrepreneurial experience and lower levels of affect towards entrepreneurship, some research suggests the opposite (Coleman & Kariv, 2014), while other studies find no significant gender differences in ESE (Mueller & Dato-On, 2008; Zhao et al., 2005). As highlighted in earlier sections, researchers have also found mixed results when examining whether gender moderates the relationships between both entrepreneurial education and work experience and ESE (Kickul et al., 2008; Shinnar et al., 2014; Wilson et al., 2007). Other work has found that gender role stereotyping negatively impacts women's ESE and subsequent intention to start a high-growth business (Sweida & Reichard, 2013), and the extent to which ESE develops amongst female entrepreneurs depends on the gender congruency of the industry in which they operate (Sweida & Woods, 2015). The mixed findings regarding the influence of gender on ESE may result from the fact that prior research has utilized dichotomous measures of physiological sex rather than examining gender as a socially-constructed phenomenon. As noted in a recent review of methodological approaches in gender and entrepreneurship research, using dichotomous measures to explicate gender differences is problematic as such an approach assumes that it is masculine traits that drive gender differences rather than the social environment (Henry, Foss, & Ahl, 2016).

Other individual differences that have been investigated as antecedents of ESE include risk-taking preferences, cognitive styles,

entrepreneurial passion, and personality characteristics. In line with social cognitive theory, such differences are likely to affect individuals' judgements of their own physiological states (the "affective state" pathway), influencing their level of self-efficacy to undertake entrepreneurial activity. For example, Zhao et al. (2005) found a positive relationship between the risk-taking preference of MBA students and their ESE, and Zhang and Cain (2017) found a similar relationship for graduate dental students. Whereas Barbosa et al. (2007) found a positive relationship between the risk-taking propensity of undergraduate students and their opportunity-identification ESE, they also found a negative relationship between their risk-taking propensity and both relationship and tolerance ESE. Barbosa et al. (2007) also examined the influence of undergraduate students' cognitive style on their ESE. They found that those with an intuitive cognitive style had lower levels of ESE in relation to establishing relationships with investors, financial management of the new venture, and capacity to tolerate ambiguity. They further found that while intuitive individuals who had a high preference for risk exhibited higher levels of opportunity-identification ESE, those with an analytic cognitive style with a low preference for risk had greater relationship and tolerance ESE than those with a high risk preference. Similarly, Kickul, Gundry, Barbosa, and Whitcanack (2009) found that while individuals with an intuitive cognitive style had greater opportunity-identification ESE, those with an analytic cognitive style had greater ESE in relation to their ability to assess, evaluate, plan and marshal resources.

Researchers have also examined the relationship between entrepreneurial passion and ESE. While both Biraglia and Kadile (2017) and Murnieks, Mosakowski, and Cardon (2014) found a strong positive relationship between entrepreneurial passion and ESE, Huyghe, Knockaert, and Obschonka (2016) found a strong relationship between both academics' entrepreneurial passion and obsessive scientific passion and their ESE. Other studies have suggested that the relationship between entrepreneurial passion and ESE is more complex, with some establishing that it is also an outcome of ESE (Cardon & Kirk, 2015; Dalborg & Wincet, 2015; Gielnik et al., 2017). Need for achievement and locus of control have also been found to influence the ESE of entrepreneurs in the context of transitional economies (Luthans & Ibrayeva, 2007). Researchers have also begun to examine the relationship between personality and ESE, finding a strong link between both conscientiousness and proactive personality and ESE (Otto, Glaser, & Dalbert, 2009; Prabhu, McGuire, Drost, & Kwong, 2012). Finally, researchers have confirmed a positive relationship between career adaptability and ESE, especially for individuals with prior exposure to a family business (Tolentino, Sedoglavich, Lu, Garcia, & Restubog, 2014).

**3.3.1.5. Other individual-level antecedents.** Another antecedent that has been shown to influence ESE is the extent to which an individual engages in counterfactual thinking, comparing actual events to alternatives that are constructed on an ad hoc basis rather than based on past experience (Arora, Haynie, & Laurence, 2013). Although Arora et al. (2013) found that counterfactual thinking was negatively related to entrepreneurs' ESE, they also established that when the entrepreneur experienced high levels of affect and self-esteem, the negative relationship became positive. A positive relationship has also been found between 'pull' entrepreneurship, defined as the extent to which individuals enter an entrepreneurial career due to its inherent attractiveness, and ESE (Dalborg & Wincet, 2015). In line with the 'affective states' pathway highlighted by Bandura (1986), researchers have also established a link between both fear of failure and social persuasion through the media and an individual's ESE (Farashah, 2015). They have also established a positive association between the number of planning activities undertaken by the entrepreneur and their ESE (McCann & Vroom, 2015), and a negative association between financial constraints face by the entrepreneur and their ESE (Venugopal et al., 2015). Biraglia and Kadile (2017) found that creativity positively influenced ESE. Finally, Hallak, Brown, and Lindsay (2012) found that place identity influenced the ESE of entrepreneurs.

### 3.3.2. Firm and macro level antecedents

Social cognitive theory highlights environmental factors as key factors that influence motivation and behavior through the pathways of enactive mastery, vicarious learning, social persuasion, and judgement of one's psychological states. Building on this foundation, researchers have begun to examine how firm and macro-level (institutional and cultural) characteristics influence individual-level ESE. We examine these studies below.

**3.3.2.1. Firm characteristics.** Researchers have begun to look at the relationship between firm-level characteristics and entrepreneurs' ESE. For example, Cooper et al. (2016) found that the firm's strategic orientation and entrepreneurial culture were positively related to entrepreneurs' innovation-focused ESE, a sub-dimension of ESE, by providing opportunities for vicarious learning. Forbes (2005) found that decision-making processes that 1) involve a wider group of employees, 2) are more comprehensive, and 3) incorporate more current information, enhance entrepreneurs' ESE by providing opportunities to engage in active mastery and vicariously learn from others, act as a source of social persuasion, and lead to more balanced physiological states. Finally, Snell, Sok, and Danaher (2015) found a positive relationship between a firm's marketing capabilities and the entrepreneur's ESE. They argue that marketing capabilities enhance entrepreneurs' confidence that they will be able to deal with challenges during entrepreneurial tasks as they lead individuals to maintain positive judgements of their own physiological states.

**3.3.2.2. Cultural and institutional environment.** Researchers have also drawn on social cognitive theory to examine how the cultural and institutional environment influences entrepreneurs' ESE. For example, Luthans and Ibrayeva (2007) argued that the positive influence of environmental dynamism and hostility on entrepreneurs' ESE occurred as such environments provide greater opportunities for enactive mastery. Hopp and Stephan (2012) found that performance-based cultural norms and socially supportive institutional environments are positively related to individual's ESE. They argued that higher levels of ESE result from greater expectations being placed on individuals for entrepreneurial performance in performance-based cultures (the social persuasion path) and greater opportunities for vicarious learning in socially supportive institutional environments.



### 3.4. Outcomes of ESE

A growing literature has examined ESE's effect on a range of entrepreneurial outcomes, as well as moderators of the ESE-outcome relationship at various stages of the entrepreneurial career process. Such work demonstrates relationships between ESE and individual outcomes such as entrepreneurial intentions, cognitive states, and various behaviors, as well as firm-level outcomes such as firm emergence, growth, and innovation. The following sections review outcomes of ESE and contingencies to these outcomes, while addressing the micro-macro link.

#### 3.4.1. Individual level outcomes

**3.4.1.1. Entrepreneurial intentions.** The most widely studied outcome of ESE is entrepreneurial intention, defined as the intention of an individual to start a new business. Most researchers have drawn on *Ajzen's (1991)* theory of planned behavior to explain the influence of ESE on entrepreneurial intentions. They argue ESE captures an individuals' perceptions that they are able to handle given situations (perceived behavioral control). In line with the theory of planned behavior, researchers have found a significant positive link between ESE and the entrepreneurial intentions of students at secondary school (*Kickul et al., 2008; Sanchez, 2013; Wilson et al., 2009*), undergraduate students (*Austin & Nauta, 2016; Bagheri & Pihie, 2014; BarNir et al., 2011; Byabashaija & Katano, 2011; Díaz-García & Jiménez-Moreno, 2010; Engle et al., 2010; Geenen, Urbig, Muehlfelda, van Witteloostuijn, & Gargalianou, 2016; Hallam, Zanella, Dosamantes, & Cardenas, 2016; Hockerts, 2017; Horvath, 2016; Kassean et al., 2015; Krueger et al., 2000; Lanero, Vazquez, & Aza, 2016; Lans, Gulikers, & Batterink, 2010; Laviolette et al., 2012; Moriano, Gorgievski, Laguna, Stephan, & Zarafshani, 2012; Pfeifer et al., 2016; Piperopoulos & Dimov, 2015; Prabhu et al., 2012; Saeed et al., 2015; Sanchez, 2011; Schenkel, D'Souza, & Braun, 2014; Segal, Borgia, & Schoenfeld, 2005; Sequeira, Mueller, & McGee, 2007; Sesen, 2013; Sieger & Monsen, 2015*) and postgraduate students (*Bacq, Ofstein, Kickul, & Gundry, 2017; Douglas, 2013; Douglas & Fitzsimmons, 2013; Fitzsimmons & Douglas, 2011; Prabhu et al., 2012; Urban, 2006; Vanevenhoven & Liguori, 2016; Wilson et al., 2009; Zellweger, Sieger, & Halter, 2011; Zhang & Cain, 2017*). For example, *Zellweger et al. (2011)* found that amongst students from family business backgrounds, those with high ESE were most likely to intend to found their own firms, followed by succession in the family enterprise, with employment the least likely choice. Although *Fitzsimmons and Douglas (2011)* found that ESE predicted students' entrepreneurial intentions, the strength of the relationship was weaker when the perceived desirability of engaging in entrepreneurship was higher. Drawing on regulatory focus theory (*Higgins, 1987*), they argue that prospective entrepreneurs are likely to adopt a prevention focus when choosing to exploit an opportunity, i.e., forming intentions to be an entrepreneur. A later study also by *Douglas (2013)*, found strong positive links between ESE and growth-oriented entrepreneurial intentions, as compared to independence-oriented entrepreneurial intentions.

Numerous researchers have also found a link between ESE and the entrepreneurial intentions of working people in both developed and developing countries (*Biraglia & Kadile, 2017; Bullough, Renko, & Myatt, 2014; Carr & Sequeira, 2007; Farashah, 2015; Naktiyok, Karabey, & Gulluce, 2010; Prodan & Drnovsek, 2010*). For example, *Venugopal et al. (2015)* found that ESE predicted entrepreneurial intentions of low income women in India. However, both *Kolvereid and Isaksen (2006)* and *Boukamcha (2015)* found no evidence of such a link, the latter for individuals undertaking training in a business incubator. A meta-analysis of studies employing the theory of planned behavior as a basis for entrepreneurial intentions found effects of ESE on such intentions were partly mediated by the perceived desirability and perceived feasibility of being an entrepreneur (*Schlaegel & Koenig, 2014*).

Although most studies treat ESE as global or higher-order construct, some researchers have treated ESE as a multi-dimensional construct, and begun to examine differential effects of sub-dimensions of ESE on entrepreneurial intentions. For example, *Naktiyok et al. (2010)* found that whereas ESE in relation to developing new product and market opportunities, building an innovative environment, defining core purpose, and coping with unexpected challenges, have a significant effect on entrepreneurial intentions, ESE in relation to initiating investor relations and developing critical human resources do not. Similarly, a longitudinal study in Poland (*Laguna, 2013*) found a strong link between ESE and entrepreneurial intentions, especially for the sub-dimension of gauging confidence in setting up business operations. Finally, *Chen and He (2011)* found that while opportunity-identification self-efficacy, relationship self-efficacy, and managerial self-efficacy predicted entrepreneurial intentions, tolerance self-efficacy did not.

In addition to classic entrepreneurial intentions, researchers have begun to examine the relationship between ESE and corporate entrepreneurial/intrapreneurial intentions, i.e., the intentions of employees to engage in entrepreneurial activity within an organizational context. For example, while *Fini and Toschi (2016)* found a strong link between ESE and corporate entrepreneurial intentions, *Douglas and Fitzsimmons (2013)* found a strong relationship between ESE and the intrapreneurial intentions of MBA students. Researchers have also found strong effects of ESE on academic spin-off or start-up intentions (*Huyghe et al., 2016*) and on venture growth expectations on the part of entrepreneurs (*Kolvereid & Isaksen, 2017*).

Finally, another group of researchers have also begun to highlight key mediating mechanisms linking ESE to entrepreneurial intentions such as self-regulation (*Pihie & Bagneri, 2013*), attitudes towards entrepreneurship (*Arshad, Farooq, Sultana, & Farooq, 2016; Tsai, Chang, & Peng, 2016*) and planned entrepreneurial control (*Tsai et al., 2016*).

**3.4.1.2. Entrepreneurial emotions/mental state.** A few studies have examined the effect of ESE on mental processes or states related to pursuit of an entrepreneurial career. Applying effectuation and situational framing approaches, *Engel et al. (2014)* found that high-ESE participants were more likely to frame uncertainty as an opportunity and to adopt effectual logic when faced with a high-uncertainty venture scenario. *Uygur and Kim (2016)* found that although ESE did not lead to more selective entrepreneurial judgement, it led to stronger conviction in entrepreneurial judgement. Researchers have also found a strong correlation between levels of ESE and entrepreneurial passion (e.g., *Cardon & Kirk, 2015; Dalborg & Wincent, 2015*), especially passion for founding, and that ESE sustains the positive influence of entrepreneurship training on passion over time (*Gielnik et al., 2017*).

Possible negative influences of ESE are a theme in [Shepherd et al. \(2013\)](#). Applying self-regulation theory, they found that ESE moderates the link between environmental values and the willingness to pursue environmentally harmful ventures. While previous studies ([Farnese, Tramontano, Fida, & Paciello, 2011](#)) suggested that low-ESE individuals under duress were more likely to trespass moral values (e.g., engage in cheating), [Shepherd et al. \(2013\)](#) suggest that high-ESE founders more highly value exploiting opportunities and may reframe such behavior as less harmful or reduce their own responsibility.

**3.4.1.3. Entrepreneurial actions/behavior.** ESE has been positively linked to various actions and behaviors in the entrepreneurial career process, such as planning, opportunity recognition, task effort, commitment to goals, and financial investment. In line with the work on entrepreneurial intentions, this research has typically drawn on the theory of planned behavior. For instance, [Cassar and Friedman \(2009\)](#) found that ESE predicted greater investment of personal funds in the venture, hours worked, and likelihood of developing and launching a business, when controlling for factors such as human capital and social capital. Meanwhile, [Trevelyan \(2011\)](#) argued that ESE encourages higher goals and goal commitment leading to task effort. Indeed, she found that ESE positively affected entrepreneurs' dedication to action- and decision-type tasks, countering arguments that over-confidence can lead to shortcuts in effort. Another study examined the link between ESE and persistence, arguing that ESE can make founders more passionate about inventing, founding, and developing firms ([Cardon & Kirk, 2015](#)). Applying theory on positive affect and self-identity, the authors found that ESE indirectly influences entrepreneurial persistence, fully mediated by entrepreneurial passion for inventing and partially mediated by passion for founding.

Based on the entrepreneurial cognition literature, [Brinckmann and Kim \(2015\)](#) theorize that ESE enhances belief in one's ability to plan and to derive benefits from a formal plan. While they found that high-ESE entrepreneurs were no more likely to engage in planning, those who did were more likely to formalize a written plan. [Tumasjan and Braun \(2012\)](#) integrate regulatory focus theory to examine opportunity recognition as a crucial step in the venturing process. They found that entrepreneurs' focus on promotion, such as aspirations and striving for gains, compensated for low levels of ESE to drive opportunity recognition. Meanwhile, entrepreneurs' focus on prevention, such as duties and loss avoidance, had no such link. The results suggest limits to ESE, as the authors propose that ESE reflects initial motivation, while regulatory focus influences motivation as venturing action moves forward.

#### 3.4.2. Firm level outcomes

Prior work examining the relationship between ESE and entrepreneurial outcomes has generally examined the influence of the founder's ESE rather than adopting an aggregated measure of team members' ESE. This approach is rooted in the notion that firm outcomes are strongly affected by characteristics of the top manager, especially in nascent firms where the founder and the organisation may be essentially the same ([Hambrick & Mason, 1984](#)).

**3.4.2.1. Entrepreneurial performance.** Previous research has generally revealed a positive link between the ESE of the founding entrepreneur and classic measures of entrepreneurial venture performance, including subjective performance perceptions, growth and innovation (e.g. [Hallak et al., 2012](#); [Hallak, Assaker, & Lee, 2015](#); [Hallak, Lindsay, & Brown, 2011](#); [McGee & Peterson, 2017](#)). A meta-analysis of the relationship between founder ESE and performance drawing on 27 studies of 5065 firms found a moderately strong effect ( $\beta = 0.31$ ) on financial outcomes such as revenue growth and profitability ([Miao et al., 2017](#)), with stronger results for subjective versus objective outcome measures. The study found positive moderators to this link were suggestive but not significant for experienced versus new entrepreneurs, young versus old firms, and firms in collectivist versus individualist cultures.

Other research has found that contingencies to the ESE-performance link include both individual as well as environmental factors. For instance, applying theories on goal-setting and self-regulation, [Baron, Mueller, and Wolfe \(2016\)](#) found that self-control moderates the effect of founder ESE on firm growth, with the ESE-growth relationship mediated by goal difficulty. Thus, while high-ESE founders may set unrealistic goals, the authors argue, self-control restrains this tendency, fueling performance. A previous study ([Hmieleski & Baron, 2008](#)) examined contingency effects of environmental dynamism and dispositional optimism on the ESE-performance link. In dynamic industry environments, the impact of founder's ESE on revenue and employment growth was more positive for entrepreneurs with moderate rather than high levels of optimism, as high ESE and optimism combined may fuel over-confidence.

Meanwhile, [Cumberland, Meek, and Germain \(2015\)](#) investigated contextual moderators of ESE's five sub-dimensions, and the influence on revenue and employment growth. They found that ESE pertaining to innovation, management, and financial control, but not risk-taking and marketing, had a positive impact on venture growth in environments of greater competitive intensity and technological turbulence. A further study found that family ownership status did not moderate the ESE-performance link ([Hallak, Assaker, & O'Connor, 2014](#)), as the influence of founder's ESE on profits and sales mattered for both family and non-family firms, especially ESE sub-dimensions regarding core purpose definition and human resource development.

Applying social network theory to Indian entrepreneurs, researchers have also found a positive relationship between an entrepreneur's ESE, network size and centrality, and sales growth and product development ([Prajapati & Biswas, 2011](#)). Amongst a similar population, [Jain and Ali \(2013\)](#) found that ESE, as well as entrepreneurial marketing orientation and entrepreneurial attitude orientation, were significantly linked with sales and profit growth.

**3.4.2.2. Venture creation.** Another performance outcome is venture creation, also termed venture emergence. Applying cultural norms and person-culture fit perspectives, [Hopp and Stephan \(2012\)](#) found that community cultural norms affect firm emergence via ESE. Specifically, performance-based cultures affected ESE and start-up motivation, while socially supportive cultures impacted motivation but not ESE, suggesting that high-ESE founders meet cultural norms in performance cultures and are more likely to achieve launch in this context.

Applying goal theory, Hechevarria, Renko, and Matthews (2012) examined the impact of ESE and formalization of a business plan on venture creation. While higher ESE and formal business planning individually increased venture creation, the interaction of the two reduced these chances, suggesting that high-ESE founders who engage in planning are less likely to found a venture that has limited chances of success. Meanwhile, Khan, Tang, and Joshi (2014) found that high ESE as well as goal commitment reduced the chance of disengagement one year on, with the effect of ESE continuing, even in a context of intense competition. Tegtmeier, Kurczewska, and Halberstadt (2016) found that female graduates with higher levels of ESE had a greater likelihood of being self-employed than those with lower ESE. Finally, drawing on GEM data for 42 countries, Wennberg et al., 2013 found that ESE predicted an individual's entry into entrepreneurship, with effects of ESE more pronounced in less collectivist countries, and countries with high uncertainty avoidance and high performance orientation.

Although most studies have established a positive influence of founder ESE on venture creation, Dalborg, von Friedrichs, and Wincenc (2015) found no such link amongst individuals who had expressed intentions to start a business. Similarly, Kolvereid and Isaksen (2006) found no link between ESE and hours worked by nascent entrepreneurs in their new ventures.

Finally, Miles et al. (2016) elevate both ESE and outcomes to the community level to explore how businesses employ entrepreneurial marketing processes (EMP) to rebuild community capital after a disaster. They propose that high levels of ESE with high EMP boosts community resilience, while high ESE/low EMP poses risks, low ESE/high EMP offers moderate resilience, and low ESE/low EMP offers the least resilience following a crisis.

### 3.5. ESE as a moderator

ESE also acts as a moderator of other predictors on entrepreneurial outcomes. Based on improvisation theory, Hmieleski and Corbett (2008) found that high ESE enhanced the effect of entrepreneurs' improvisation on sales growth. Yet the opposite was true for work satisfaction as an outcome: improvisation negatively affected satisfaction for high-ESE founders, suggesting that ESE can drive entrepreneurs to burn out. Gielnik et al. (2017) found that ESE sustains the positive influence of entrepreneurship training on entrepreneurial passion over time, which in turn fosters business creation. Fitzsimmons and Douglas (2011) found that ESE negatively interacted with individual's attitudes towards entrepreneurship (perceived desirability of entrepreneurship) to predict individuals' entrepreneurial intentions. In particular, they found that individuals with low levels of perceived desirability still develop intentions to act entrepreneurially when they perceived themselves capable of doing so (high levels of ESE). However, they also found that individuals with high levels of perceived desirability develop intentions to act entrepreneurially irrespective of whether they perceive themselves as having the feasibility (ESE) to do so. Sieger and Minola (2017) found that when ESE was higher, the negative relationship between availability of family financial support and entrepreneurial intentions was weaker. Baum and Bird (2010) found that ESE interacted with successful intelligence (SI) to predict venture performance via swift action and multiple improvement actions. As well as mediating the relationship between proactive personality and entrepreneurial intentions, Prabhu et al. (2012) found that ESE also moderated the relationship. Hsu, Wiklund, and Cotton (2017) found that ESE of entrepreneurs after exiting their ventures moderated the relationship between perceived financial performance and subsequent entrepreneurial intentions, in such a way that the higher the ESE, the weaker the negative relationship between perceived financial performance and subsequent entrepreneurial intention. Daniel, Di Domenico, and Sharma (2015) found that entrepreneurs running home-based online businesses engaged in effectuation irrespective of their levels of ESE. Finally, Ahlin, Drnovsek, and Hisrich (2014) found that ESE was positively related to product innovation and process innovation amongst entrepreneurs in the US and Slovenia, and positively moderated the link between creativity and both kinds of innovation in the US but not in Slovenia.

## 4. Agenda for future research

The previous sections reviewed the extant literature on the antecedents and outcomes of ESE. Our review established that authors have typically drawn on Bandura's social cognitive theory to investigate the individual-level antecedents of ESE, which include work experience, education and training, presence of role models and mentors, and individual differences. A smaller body of research has also begun to look at firm and macro-level antecedents of ESE. In line with the majority of entrepreneurship research, we have also witnessed extensive research on the outcomes of ESE, including individuals' entrepreneurial intentions, emotions and mental states, actions and behaviors, and also entrepreneurial performance and venture creation at the firm-level. A focus on entrepreneurial performance and venture creation is important as such outcomes have been linked to economic growth and prosperity. As with the antecedents of ESE, work on the outcomes of ESE has typically drawn on Bandura's social cognitive theory, and to a lesser degree the theory of planned behavior, and has only occasionally considered other theoretical perspectives to explain how ESE transmits its effects.

Our review identified a dearth of research examining the effects of ESE on employee's vocational behavior outside the context of entrepreneurial ventures. This is surprising, given that firms are increasingly requiring employees to act in an entrepreneurial manner, working on self-directed, short-term team projects in temporary settings (e.g., in innovation teams). Another limitation identified by the review is a lack of empirical investigation as to whether and how ESE fluctuates and changes in the short- and long-term, and the factors that influence such changes. The review also identified that research has predominantly focused on the positive effects of ESE with limited attention placed on situations where it is less potent, or may even have negative effects. From our review it is also evident that researchers have not examined whether ESE may exist at the team- or group level. This is surprising given the increasing phenomenon of entrepreneurial teams and the growth of team-based organizational structures in the contemporary workplace. Based on our review of the literature we present a framework which synthesizes findings from previous research (see

Fig. 1). Drawing on this framework and the gaps in the literature identified, we set out an agenda for future research in the following sections.

#### 4.1. Drivers of short-term fluctuations and long-term changes in entrepreneurial self-efficacy

In order to determine whether ESE is better conceptualized as a relatively stable trait or a developmental state, researchers should seek to ascertain the extent to which ESE fluctuates over the short-term and changes over the long-term, and pinpoint the factors that cause short-term fluctuations and more long-term systematic changes (Gist & Mitchell, 1992).

In light of work which shows that about half of the variance in motivational factors, such as ESE, is within-person variance (Lord, Diefendorff, Schmidt, & Hall, 2010), investigating the factors which cause within-person variance (fluctuations) in ESE over a period of days or weeks should be paid more attention in future research. In examining this, researchers should consider adopting a diary study design, where participants provide daily or weekly ratings over a period of weeks on ESE and its potential antecedents. Such an approach will be able to pinpoint situational or personal factors that lead to fluctuations in an individual's ESE. For example, researchers might investigate whether ESE beliefs vary in response to situational demands faced by the individual. In his recent article, Bledow (2013) argues that self-efficacy increases as a result of an internal mechanism that mobilizes resources for a task. In other words, it is a dynamic response to situational demands rather than a static belief. Future research should further investigate this notion empirically.

Researchers might also investigate the factors that lead to more long-term systematic changes in an individual's ESE. Social cognitive theory (Bandura, 1986, 1997) offers a rich theory-driven and evidence-based framework to examine such changes that result from an individuals' interaction with their environment. For example, relatively little is known about which of the four pathways highlighted in this theory (mastery experiences, role modeling [vicarious learning], social persuasion and affective states) are most effective in fostering long-term changes in ESE, and whether exposure to entrepreneurial role models and mentors is likely to have a similar effect on the ESE of more experienced entrepreneurs already engaged in entrepreneurial activity, vis-à-vis adolescents and young adults. Researchers might also investigate whether an entrepreneur's ESE changes over time as entrepreneurs become more experienced, experience success or failure, acquire knowledge and develop social networks. This research could also address the question whether and why serial entrepreneurs might have higher levels of ESE than novice entrepreneurs (Brandle, Berger, Golla, & Kuckertz, 2018). Examining the role of entrepreneurial experience in fostering (or reducing) ESE is especially encouraged given the results of a meta-analysis by Sitzmann and Yeo (2013) in which they found that general self-efficacy is primarily a product of past experience (in this case performance) rather than the precursor of future performance. Theoretically, we might expect career success to boost ESE, but there is growing recognition that challenging experiences rather than success (Hmieleski & Carr, 2008), and even business failure (Jenkins, Wiklund, & Brundin, 2014), may foster the development of psychological resources such as ESE amongst entrepreneurs. Indeed, Bandura and Locke (2003, p.94) propose that business success may lead to varied levels of self-efficacy as “many who drive themselves to hard-won success are left with self-doubts that they can duplicate the feat.” Therefore future research should do more to delineate the effects of entrepreneurial experiences (both positive and negative) on ESE.

Future research could also address a certain “gravity effect” of broad and relatively stable personality traits such as the Big Five on ESE (Obschonka & Stuetzer, 2017). For example, researchers might examine whether individuals with an entrepreneurial ‘big five’ structure develop higher levels of ESE as an expression of their basic personality structure, and whether the long-term influence of entrepreneurship training and education programs on ESE depends on the individual big five structure due to a gravity effect of these traits.

#### 4.2. Developmental precursors of ese in childhood, adolescence and early adulthood

We call on researchers to consider a developmental life-span perspective (Baltes & Smith, 2004) to examine how ESE develops during the early formative years before the beginning of an individual's actual occupational career. Such a perspective emphasizes that a person's vocational development starts in childhood and adolescence (Hartung, Porfeli, & Vondracek, 2005), with important early developmental precursors of the entrepreneurial mindset that includes ESE (Obschonka, 2016). Research indicates, for example, that early, age-appropriate entrepreneurial activities and competencies in childhood and adolescence (e.g., early leadership and early commercialization and inventive activities) predict ESE in adulthood (e.g., Obschonka, Silbereisen, & Schmitt-Rodermund, 2010).

Researchers should also take a closer look at the role of entrepreneurship education and training programs in fostering ESE amongst individuals in childhood, adolescence and early adulthood. For example, although it has been argued that entrepreneurial education programs foster ESE through providing opportunities for mastery, role modeling, verbal encouragement, and awareness of physiological and emotional states (Boukamcha, 2015; Hodzic et al., 2015; Maritz & Brown, 2013), the relative importance of different pathways at different life stages has received limited empirical attention. Understanding the pathways by which ESE develops will assist policy makers in determining where to best target entrepreneurship training and education.

#### 4.3. Negative/curvilinear effects of entrepreneurial self-efficacy

Prior work on ESE has predominantly focused on the positive outcomes of ESE with limited attention being paid to its potential downside. Drawing on the meta-theoretical principle of ‘the too-much-of-a-good-thing effect’ (Pierce & Aguinis, 2013), which suggests that levels of typically beneficial antecedents reach tipping points, after which their relationships with positive outcomes move from being linear and positive to curvilinear and negative, we might expect ESE to have curvilinear effects on entrepreneurial



outcomes. For example, although ESE is thought to have a positive effect on venture creation and venture performance, very high levels of ESE might increase extreme risk-taking behavior, which in turn could negatively influence venture survival or performance. In support of such an assertion, there is growing work on general self-efficacy that suggests its influence may be curvilinear (Vancouver, Thompson, Tischner, & Putka, 2002). For example, recent work has found that the positive effects of self-efficacy on employee performance may reach an inflection point at which its effects become negative (Beck & Schmidt, 2012). In addition, researchers have found that expectancy beliefs such self-efficacy are positively linked to goal choice, yet have a negative relationship to allocation of effort for chosen goals, given belief in one's capabilities or positive conditions for goal achievement (Sun, Vancouver, & Weinhardt, 2014; Vancouver, More, & Yoder, 2008).

Future work could link ESE to related constructs such as overconfidence and over-optimism, which occur when individuals' predictions or expectations do not correspond with outcomes (Simon & Houghton, 2003). Overconfidence and over-optimism, have been shown to have mixed effects on entrepreneurial and organizational outcomes. For example, individuals high in overconfidence or over-optimism have been shown to be more likely to enter self-employment but also to exit (Dawson & Henley, 2013; Koellinger, Minniti, & Schade, 2007), and recent research has found a curvilinear relationship between optimistic overconfidence and success in the introduction of new products (Simon & Shrader, 2012). In light of such work, future research might examine whether individuals with high levels of ESE are more likely to display cognitive biases such as overconfidence and examine the negative effects that may occur as a result. For example, as stressed in Obschonka et al. (2010), individuals with high levels of ESE might experience an illusion of control at work in that they are overconfident, despite a personal lack of actual entrepreneurial means (e.g., skills and networks).

#### 4.4. *Alternative theoretical approaches to the study of entrepreneurial self-efficacy*

Although, as highlighted earlier, prior work on the antecedents and outcomes of ESE has typically drawn on social cognitive theory and the theory of planned behavior, alternative theoretical approaches may help aid our understanding as to why individuals with higher levels of ESE achieve greater entrepreneurial motivation, behavior, persistence, and performance, and how ESE enables individuals to deal with uncertain and challenging situations at work. In particular, researchers may consider drawing upon the conservation of resources (COR) theory (Hobfoll, 1989) and job-demands resources (JD-R) theory (Bakker & Demerouti, 2007), to enhance our understanding of how ESE transmits its effects and when it is most influential. For example, under the COR theory, ESE might be viewed as a personal psychological resource that leads individuals to invest greater resources at work (a gain spiral), which in turn influences entrepreneurial and intrapreneurial outcomes. Similarly, under the JD-R theory, ESE might be viewed as a personal resource that buffers the negative effects of the demands that arise from entrepreneurial work environments such as work overload, time pressure, and team conflict.

In addition to drawing on resource theories, future research might consider integrating theoretical perspectives from the vocational behavior literature such as social cognitive career theory (Lent et al., 1994) and career construction theory (Savickas et al., 2009), to specify how ESE affects individuals' interest and intention to pursue entrepreneurial projects in organizations, move into an entrepreneurial career, and succeed in entrepreneurial endeavors.

#### 4.5. *Entrepreneurial self-efficacy as a collective phenomenon*

In keeping with the literature on self-efficacy in organizational contexts (Chen & Bliese, 2002), research on ESE should also consider examining ESE as a group or team-level (collective) construct and assess the factors which lead to the development of collective ESE. Whereas entrepreneurship scholars already highlighted the potential role of collective ESE (e.g., Krueger Jr, 2003), empirical research has not yet addressed it. In line with prior work on general self-efficacy, we may expect organizational leadership, climate, and team characteristics to predict the development and strength of collective ESE within entrepreneurial teams where several entrepreneurs work together and groups within more mainstream organizations (Chen & Bliese, 2002; Dawkins, Martin, Scott, & Sanderson, 2015).

#### 4.6. *Effects of entrepreneurial self-efficacy beyond the entrepreneurial venture context*

Given that existing research on ESE mainly focuses on entrepreneurial intentions and behavior with respect to the founding and development of entrepreneurial ventures, researchers could broaden the scope of the study of ESE by examining the effects of ESE in other populations than entrepreneurs, and with respect to other work and career outcomes. As stressed earlier, entrepreneurial thinking and acting is not only crucial with respect to classical entrepreneurial outcomes such as venture creation and growth, but also influences intrapreneurship within more established businesses, and can also be considered as a general skill-set that assists the individual to proactively manage his/her own career in times of uncertainty and change. Future research should therefore examine the importance of ESE to work and career outcomes amongst populations other than entrepreneurs. Such research could, for example, draw from recent theoretical developments in social cognitive career theory (Lent & Brown, 2013) and put a special focus on ESE in career self-management.

#### 4.7. *Improving measurement of entrepreneurial self-efficacy*

Our review identified a number of concerns with the methodology adopted in previous research on ESE. Most significant was the lack of consistency in how ESE had been measured. We call on researchers to be consistent in how they measure ESE in future



research as this will ensure for generalizability and comparison across studies. More specifically, although we note that the Chen et al. (1998) measure has been the most widely tested and validated in the previous literature, we call on researchers to consider using the DeNoble et al. (1999) and McGee et al. (2009) measures which made improvements on the Chen et al. (1998) measure. In particular, we advocate the use of the McGee et al. (2009) measure for researchers who wish to examine ESE in different stages of the venture creation and development process. However, we also call on researchers to develop new measures that assess ESE in relation to entrepreneurial activity in more mainstream organizational contexts (i.e., outside a new venture setting), and in the context of entrepreneurial career management (i.e., whether an individual feels confident managing their career in an uncertain, risky environment).

In terms of research design, we found that prior research typically relied on cross-sectional data to examine the link between ESE and its antecedents/outcomes. Such a research design does not allow us to infer causality or rule out common method bias. We therefore call on researchers to collect panel data from multiple sources using longitudinal research designs in order to provide stronger inferences of causality and rule out common method bias.

## 5. Conclusion

The present study conducted a systematic review of prior research on entrepreneurial self-efficacy. As well as examining how ESE has been measured in previous research, extant work on its antecedents and outcomes was also reviewed. In reviewing the literature, key gaps in the literature were identified and an agenda for future research presented which highlights opportunities for empirical and theoretical advancement of the field.

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